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General Notes.

GEOLOGY AND PALEONTOLOGY.

Geological Survey of New Jersey, 1890.¹—This annual report covers the work done under the direction of Mr. I. S. Upson, assistant-in-charge under the late Dr. G. H. Cook, and the present state geologist, Mr. J. C. Smock. It includes the report of Frank L. Nason on the crystalline rocks of the Highlands, and of the magnetic ores of that district; Mr. Coman's notes on (1) the sediments overlying the upper marl beds in eastern Monmouth county, (2) evidences of former shore-lines above the present sea-level, (3) the gravel of the Trenton terrace; Mr. C. C. Vermeule's report on the observations of stream-flow and rainfall up to date; a paper from Mr. Lewis Woolman describing the artesian wells in the southeastern coast-belts of the state; and, finally, an account by G. W. Howell of the drainage work inaugurated by the survey and carried on with so much success and such beneficial results.

Mr. Nason's careful examination of the outcrops has resulted in the discovery of organic remains in the crystalline limestones, which have been referred by Prof. C. E. Beecher to the Cambrian, and below the Potsdam sandstone formation, as has been done by Mr. Lewis Woolman in Pennsylvania. His ideas concerning the limestones of Sussex county are summed up in the following conclusions:

“First, the white limestones of Sussex and Warren counties are of post-Archean age. Second, the white and blue limestones belong to a synchronous horizon. Third, this horizon is the horizon of the *Olenellus* fauna.”

The extent of these conclusions is more far-reaching than is at first sight apparent. First, it demands that a careful search be made for fossils in the whole belt, or rather belts, of limestones, sandstones, slates and shales hitherto called and regarded as Potsdam, Trenton, and Hudson River. The result may prove the existence of a great horizon of rocks in New Jersey, New York, and Pennsylvania hitherto unsuspected, and may also throw much light on the question as to the position of the Green Pond Mountain rocks. Second, in this belt are rocks—limestones, sandstones, slates, iron and zinc ores—in every

¹ Geological Survey of New Jersey: Annual Report of the State Geologist for the year 1890.

degree of metamorphism. The belt is penetrated by various kinds of igneous rocks; and the petrography and chemistry of rocks and minerals in every stage of metamorphism, induced by pressure and heat, can be traced out and its history deciphered to its minutest details. It is rare to find rocks of known geological age in which such favorable conditions exist. The histories thus elaborated can be used most advantageously in deciphering other localities whose history is written in less legible characters.

Elevated Sea-Beach on Grand Cayman.—Southeast from the Isle of Pines, and distant about two and one-half degrees, lies the Grand Cayman Island. Politically it is a dependency of Jamaica, from which it is separated about as far as it is from the Isle of Pines. Geographically it seems to be more closely associated with Cuba than with Jamaica, in so far as any argument derived from the ocean depths around would indicate. The water gradually deepens from about three hundred and fifty fathoms at Cape Cruz (Cuba) to about eight hundred at Cayman Brac and Little Cayman; thence to over one thousand one hundred fathoms as one approaches the Grand Cayman. The course from Cape Cruz to the Grand Cayman is west by south. The distance is one hundred and forty nautical miles; and as the smaller islands of Cayman Brac and Little Cayman lie almost in the line indicated between Cape Cruz and Grand Cayman, and as the water deepens north and south of the line, one readily recognizes the presence of a submarine ridge stretching from Cuba to Grand Cayman, of which these Caymans are themselves merely coral-capped summits.

The main fact here indicated is the distance, and the depth of ocean which surrounds this island of the Grand Cayman; to the south of it two, and even three, thousand fathoms are found. During the past winter I made a brief visit to the southern shore of the Grand Cayman. My attention was called to a sea-beach or wall, fifteen feet above the present tide-level. The most casual observer could not fail to notice that it indicated the action of the water, and that the materials of the beach came from the water. The broken and worn masses of coral along this higher shore led to but one conclusion. I immediately began speculating on the time required to form that shore-line, and how long it took place, etc. The fact is, however, that the whole thing happened in a single day, during one of the fearful hurricanes which swept over the island in the earlier part of this century. The testimony on this point is quite too direct and positive to admit of any doubt.

PLATE XVIII.



STORM BEACH ON GRAND CAYMAN.

The vast depth of water to the south of the island, and the long unbroken sweep of the ocean in the same direction, prepare one to believe anything might be possible when that vast body of water was urged on by a tropical hurricane. The illustration shows the hurricane beach above and the present line of the water below. (Plate XVIII.)

The most obvious lesson of this special case is a due caution in reasoning on shore elevations, unless all the elements of the problem are absolutely known.—J. T. ROTHROCK.

New Acquisitions to the Eocene Fauna from Southern Patagonia.—In a letter dated May 5th, 1891, M. Florentino Ameghino informs us of the paleontological researches of his brother, Carlos Ameghino, on the borders of the river Gallegos, in Patagonia,—whose former researches we have already made known to our readers. The new results may be summed up as follows :

1. The lemurs (*Prosimiæ*) are for the first time found in the Eocene of Patagonia.

2. The discovery of new species of *Microbiotheriidae* in good condition serves to confirm the opinion advanced by M. Ameghino in his last work on the *Plagiaulacidae*. The *Microbiotheriidae* have multiple incisors (four on each side), and so seem to represent the ancestral type of the *Plagiaulacidae* and of the *Diprotodont Marsupials*.

3. The same formation furnished an entirely new group of *Plagiaulacidae* with multitubercular molar teeth, but with the same dental formula as the species already known. The last molar is, however, entirely rudimentary. These new types connect the *Plagiaulacidae* of Patagonia previously described with the *Plagiaulacidae* of Europe and of North America. (*Revue Scientifique*, July 4th, 1891.)

The Progress in Geology for the Years 1887-1888.—In a résumé of the geological work done in the years 1887-1888, Mr. W. J. McGee cites the following as the most important :

1. The transition from an empiric classification in geology to a natural one by processes or by fundamental principles and laws.

2. The birth of the new geology, which interprets geologic history from the records of degradation, as the old geology did from the records of deposition.

3. The invention of a method of determining the depth of earthquake centers and of the velocity of earthquake transmission.

4. The recognition and definition of a great geologic group,—the Algonkian, and also of a subgroup of rocks,—the Lower Cretaceous, and the correct determination of the succession of the subordinate

divisions of the Silurian and Cambrian in the structurally complex field east of the Hudson River. (Smithsonian Report for 1888.)

We fail to see that Mr. McGee sustains the comprehensive claims made under the first and second heads. Both departments of geology referred to had been fully established prior to 1887!

Fossil Birds from the Equus Beds of Oregon.—In the AMERICAN NATURALIST of last April (1891) the present writer invited attention to the fact that he had in hand for description a large collection of fossil birds from the Upper Pliocene of the Silver Lake region, Oregon. A small part of these had been loaned by Professor Condon, of the University of Oregon, but the great bulk of the collection belonged to the cabinet of Professor Cope, who had with marked generosity placed them at my disposal for the aforesaid purpose.

My labors upon this fine collection have now been completed, and the work is ready to be passed into the hands of the printers and engravers. The memoir will make a quarto volume of upwards of a hundred pages, and is illustrated by four quarto plates, presenting over forty figures of the bones of the new species and genera.

The present notice pretends to be nothing more than a brief abstract, giving a list of the species described, with remarks thereon.

Those indicated by an * have already been either noticed or described elsewhere by Professor Cope.

PYGOPODES.

- | | |
|---------------------------------------|--|
| 1. <i>Æchmophorus occidentalis</i> .* | 3. <i>Colymbus auritus</i> ? |
| 2. <i>Colymbus holbællii</i> . | 4. <i>Colymbus nigricollis californicus</i> .* |
| 5. <i>Podilymbus podiceps</i> .* | |

LONGIPENNES.

- | | |
|---|---------------------------------|
| 6. <i>Larus argentatus smithsonianus</i> . | 10. <i>Larus philadelphia</i> . |
| 7. <i>Larus robustus</i> . Sp. nov. | 11. <i>Xema sabinii</i> . |
| 8. <i>Larus californicus</i> ? | 12. <i>Sterna elegans</i> ? |
| 9. <i>Larus oregonus</i> . Sp. nov. | 13. <i>Sterna fosteri</i> ? |
| 14. <i>Hydrochelidon nigra surinamensis</i> . | |

STEGANOPODES.

- | | |
|--------------------------------------|--|
| 15. <i>Phalacrocorax macropus</i> .* | 16. <i>Pelecanus erythrorhynchus</i> ? |
|--------------------------------------|--|

ANSERES.

- | | |
|------------------------------------|--------------------------------|
| 17. <i>Lophodytes cucullatus</i> . | 20. <i>Anas carolinensis</i> . |
| 18. <i>Anas boschas</i> . | 21. <i>Anas discors</i> . |
| 19. <i>Anas americana</i> . | 22. <i>Anas cyanoptera</i> ? |

- | | |
|--------------------------------------|---|
| 23. <i>Spatula clypeata</i> . | 29. <i>Branta hypsibatus</i> .* |
| 24. <i>Dafila acuta</i> . | 30. <i>Branta propinqua</i> . Sp. nov.* |
| 25. <i>Aix sponsa</i> . | 31. <i>Branta canadensis</i> .* |
| 26. <i>Aythya marila nearctica</i> ? | 32. <i>Anser condoni</i> . Sp. nov. |
| 27. <i>Glaucionetta islandica</i> . | 33. <i>Anser albifrons gambelii</i> .* |
| 28. <i>Clangula hyemalis</i> . | 34. <i>Chen hyperborea</i> . |
| | 35. <i>Olor paloregonus</i> .* |

ODONTOGLOSSÆ.

- 36.
- Phœnicopterus copei*
- . Sp. nov.

HERODIONES.

- 38.
- Ardea paloccidentalis*
- . Sp. nov.

PALUDICOLÆ.

- 39.
- Fulica americana*
- .* 40.
- Fulica minor*
- . Sp. nov.

LIMICOLÆ.

- 41.
- Phalaropus lobatus*
- .

GALLINÆ.

- | | |
|--|--|
| 42. <i>Tympanuchus pallidicinctus</i> . | 44. <i>Pediocætes lucasii</i> . Sp. nov. |
| 43. <i>Pediocætes phasianellus columbianus</i> . | 45. <i>Pediocætes namus</i> . Sp. nov. |
| | 46. <i>Palæotetrix gillii</i> . Gen. et Sp. nov. |

ACCIPITRES.

- 47.
- Aquila pliogryps*
- . Sp. nov. 48.
- Aquila sodalis*
- . Sp. nov.

STRIGES.

- 49.
- Bubo virginianus*
- .

PASSERES.

- 50.
- Scolecophagus affinis*
- . Sp. nov. 51.
- Corvus annectens*
- . Sp. nov.

Of the fifty-one species here enumerated ten have already been noticed by Cope, three of which were described as new, and one of which has since proved to be new,—*i. e.*, the brant I have described above as *Branta propinqua*.

Larus robustus is represented by a left coracoid, which is nearly perfect. This bone is shorter and stouter than the corresponding element in *Larus glaucus*; otherwise its characters are almost identically the same. *Larus robustus* was a gull rather smaller than *L. glaucus*, with which it may easily have been closely related.

Another gull was *Larus oregonus*, an extinct species new to science, which was about the size of *Larus delawarensis*, and its existence is based upon two humeri, both from the left side of two different individuals. The characters exhibited on the part of these bones are distinctly different from those of other gulls of this size. *Anser condonii* is a great extinct goose, vastly larger than our present existing Canada goose (*B. canadensis*). Its remains are represented in Professor Cope's collection by a fractured *os furcula* and the parts of two others. These were carefully compared with the furculæ of a number of our wild geese and swans of the genera *Chen*, *Anser*, *Branta*, *Dendrocygna*, and *Olor*, and it was found that, upon the whole, the majority of its characters agree best with *Anser albifrons*.

These characters and comparisons are dwelt upon in detail in my forthcoming memoir. I have named this goose after Professor Thomas Condon, of the University of Oregon, the first naturalist who discovered and collected any of the remains of fossil birds in the Silver Lake region of Oregon. A fine series of bones represents the new brant, *Branta propinqua*,—a small goose evidently referred to by Cope as a species that came "near *nigricans*." I propose the above name for this now extinct form.

One of the most interesting discoveries made in the Silver Lake region was the fossil remains of a new species of a now extinct flamingo, which I have called *Phænicopterus copei*, in honor of Professor E. D. Cope, who discovered it. I found a number of bones belonging to this species in the collection, and a study of them reveals the fact that *P. copei* was a somewhat taller and longer-winged flamingo than *P. ruber*, though at the same time it was probably not quite so stout in the body.

A small heron, to which I have given the name of *Ardea paloccidentalis*, and a new coot, *Fulica minor*, smaller than *Fulica americana*, were, as will be seen in the list given above, also among the novelties. The first-named was a species somewhat larger than *A. candidissima*, and smaller than *A. egretta*, with osteological characters identical with existing herons. Osteologically, too, the two coots agree, the species differing only in size.

It will be observed that the Gallinæ were very well represented in the avifauna of Western Oregon during the later Tertiary times, and among their fossil remains I found three species of them that proved to be new. Both of these were closely related to *Pediocates phasianellus columbianus*. The larger form, *Pediocates lucasii*, I have named in honor of my friend, Mr. F. A. Lucas, in recognition of his published labors in

avian osteology, and his past and present museum work, both in paleontology and bird-structure.

P. nanus was smaller than *columbianus*, and decidedly smaller than *P. lucasii*.

Another grouse was *Palaeotetrix gillii*, a rare form apparently, and one smaller than a female *Centrocercus*, but considerably larger than the largest forms of *Tympanuchus*. It was probably related to several of the existing species, and may have been in the ancestral line of the sage cocks. Its remains exhibit osteological characters that differentiate it generically from our present tetraonine types. I have named it in honor of Dr. Theodore Gill, the eminent ichthyologist and biologist.

Two new eagles were also discovered, but their fossil remains were not abundant. *Aquila pliogryps* I believe to have been a large bird,—somewhat larger than *A. chrysaëtos*, to which it was apparently related. In its proportions it was apparently of a more slender build, however, and may have had habits akin to the falcons, and was at any rate a very formidable bird. *Aquila sodalis* was a considerably smaller eagle than *A. pliogryps*, though not much smaller than *A. chrysaëtos*. None of the lesser *Accipitres* were discovered.

Among the *Passeres*, I met in the collection with the remains of an extinct blackbird, which I have called *Scolecophagus affinis*, it being related to Brewer's blackbird, and probably in those Pliocene times resorted in numbers to the vegetal growth of the margins of the lakes. *Corvus annectens* was a raven, smaller in size than any of our present ravens, to which it was very closely related.

It is not my intention here to abstract any part of my "conclusions" in reference to the avifauna of the Equus beds of Oregon, as such remarks can well remain until the appearance of the general work upon the subject.

In closing, it gives me pleasure to tender my sincere thanks to Professor G. Brown Goode, of the National Museum, for the unlimited facilities extended to me in the matter of the loan of the skeletons of existing birds from the museum's collections; also to Mr. Lucas for his kindness in getting them to me after my request in that direction had been granted. That material, added to my own collection of bird skeletons, was ample for all purposes of comparison, for all the necessary existing species were at my command.—*R. W. Shufeldt, M.D., Smithsonian Institution, Washington, D. C.*

Geological News.—General.—Mr. L. J. Clark confirms Fleming's theory that the Island of Toronto is formed of material which came originally from the Scarboro' Heights, and that the mechanical

force which transported the material to its present resting-place was the storm action of waves. (Trans. Can. Inst., March, 1891.)—The most interesting fact developed in the recent surveys of the Pacific coast is that the coast-line of Southern California is more abrupt than that of any part of the Atlantic or other portion of the Pacific. (*Scien. Am.*, July 25th, 1891.)

Archean.—Professors Solas and Cole call attention to the streakiness which characterizes the interlamination of an olivine and coral sand-rock, and note its resemblance to eozoneal and serpentinous limestone. (Proceed. Roy. Dublin Soc., 1891, p. 124.)

Paleozoic.—Sir William Dawson has described a new fossil plant, *Lepidodendron murrayanum*, from the Carboniferous rocks of Newfoundland. The specimen shows the character of the old stem, branches, and leaves. (Bull. Geol. Soc. Am., Vol. II., p. 532).—Rev. H. Herzer has found in the Upper Helderberg limestone, near Sandusky, Ohio, a fossil fragment of an Alga, which has been described by Prof. Lesquereux under the name, *Halymenites herzerii*. The specimen is remarkable, and of great value, from the fact that its internal structure is so well preserved that its characters are clearly discernible. One or two specimens only of that kind are recorded by paleobotanists (Proceeds Nat. Mus., Vol. XIII.)—Mr. H. M. Ami has contributed a paper to the *Canadian Record of Science*, April, 1891, in which he says that it is perhaps premature to state the precise geological horizon of the strata at Quebec city, but in his opinion they occupy a position in the Ordovician system higher than the Lewis formation, but lower than the Trenton, and are probably an upward extension of Sir William Logan's "Quebec Group." This would make them about equivalent to the Chazy formation of the New York and Ontario divisions.

Mesozoic.—M. Kilian and M. Leenhardt have decided that from a stratigraphical standpoint the sands of the valley of the Apt, in Southeastern France, are Cretacic, and not Tertiary, as has been thought. (Bull. No. 16, Tome II., de la Carte Geol. de la France.)—Mr. A. J. Jukes-Brown and Rev. W. R. Andrews have ascertained, by means of a well sunk at Dinton, Eng., that there is a well-developed Upper Purbeck series in the vale of Wardour, with a thickness of 70 or 80 feet, and this is succeeded by representatives of the Wealden and Vectian series, which, however, are poorly developed, and taken together are less than 100 feet. (*Geol. Mag.*, July, 1891.)—Mt. Diablo is an isolated peak of the Coast Ranges of California, lying about 27 miles

east by north of San Francisco. H. W. Turner reports that it consists of a central mass of metamorphic rocks. The strata immediately surrounding the metamorphic mass are, except for a space on the southwest, of Cretaceous age. Next to the Cretaceous, going away from the mountain in any direction, are Eocene (Tejon) strata, and these are followed successively by Miocene, Pliocene, and Plistocene deposits. (Bull. Geol. Soc. Am., Vol. II., pp. 385-414.)

Cenozoic.—M. Depéret has recently published a list of the fauna from the different Pliocene beds of Theziers. It contains 302 species, and many varieties, of invertebrates, comprising 112 Gastropods, 107 Lamellibranchs, 3 Pteropods, 5 Brachiopods, 3 Crustaceans, 4 Echinoderms, 7 Polyyps, and 1 Bryozoan. This is much the most extensive that has been given for any single formation of the valley of the Rhone. (Bull. No. 6, Tome II., de la Carte Geol. de la France.)—M. Gaudry announces the discovery of mastodon remains near Chérichira, in Tunis, probably the jaw of *M. angustidens*, similar to that of the Middle Miocene of Sansan. (*Rev. Sci.*, Ju 20th, 1891.)—In a recent paper (Bull. Wash. Philos. Soc., Vol. XI., pp. 385-410.) on the Mohawk beds in Eastern California, Mr. Henry Ward reaches the following conclusions: "The Mohawk valley is the bed of a Plistocene lake caused by the damming up of the cañon of the Feather River by a flow of andesitic lava. Glaciers existed contemporaneously with the lake."—According to R. Ellsworth Call, the Loess of Eastern Arkansas is Plistocene; the gravels and sands, Tertiary; and the lower clays, as indicated by the few fossils found, are Eocene Tertiary. The Loess about Helena is rich in fossil land-shells, but in general the fossiliferous exposures are few. Minerals of economic importance are not to be found, nor are the lignites of any importance from an economic standpoint. (Ann. Rept. Ark. Geol. Sur., 1889.)—Recent researches by W. J. McGee have shown that the Appomattox formation consists of a series of obscurely stratified loams, clays, and orange sands, with local accumulations of gravel about waterways. It forms a widespread terrane, almost continuous with the Coastal Plain between the Rappahannock and the Mississippi. No characteristic fossils have been found in it, but its stratigraphic position, unconformably below the Plistocene, and unconformably above the Miocene, indicates an age corresponding roughly with the Pliocene. (Bull. Geol. Soc. Am., Vol. I.)